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>

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To Edward Hammer/R5/USEPA/US@EPA

cc Scott Twait <Scott.Twait@epa.state.il.us>, Thomas Andryk <Thomas.Andryk@epa.state.il.us>

bcc

Subject Recalculation of TDS for ExxonMobil

History: This message has been replied to and forwarded.

Ed, I hope this helps. Note that the numbers changed slightly for the new sulfate standard from what I gave you over the phone. Scott checked my calculation and found that I had used a wrong integer.

The existing General Use TDS standard of 1,000 mg/L and Secondary Contact and Indigenous Aquatic Life (SCIAL) standard of 1,500 mg/L date from the original IPCB WQS of 1972. The reasoning given for the 1,500 mg/L SCIAL standard was that "this equals the existing effluent standard" (since repealed - no TDS effluent standard now exists). The General Use standard was adopted based on the opinion of a Dr. Lackey and Mckee and Wolf (1963 California criteria) that "aquatic life should not be harmed". There was never any "calculation" of these standards in the modern sense.

In our efforts to revise sulfate and TDS standards for General Use, we have calculated a standard based on aquatic life, behind the theory that TDS is a very poor parameter to base a standard upon when information is available for all the major anion constituents of TDS. In other words, protective chloride and sulfate standards make the TDS standard expendable. For example, if TDS is due to high chloride, a TDS standard of 1,000 mg/L is reasonable. But if TDS is due to more sulfate and little chloride, 3,000 or more TDS is closer to the toxic threshold.

So, if one wanted to see what concentration of TDS was within the threshold of toxicity for a certain combination of sulfate and chloride, the newly agreed upon (but as yet not proposed before the IPCB) sulfate standard, based as it is on chloride (and hardness) is useful. The General Use chloride standard of 500 mg/L is thought to be protective and there are no plans to revise it. The new (future) sulfate standard is as follows:

[1276.7 + 5.508(hardness) - 1.457 (chloride)] * 0.65

The lower DesPlaines has a hardness of 205 mg/L under critical conditions and the highest chloride value known to me is 450 mg/L. The resulting sulfate standard is 1138 mg/L. To help us evaluate the ExxonMobil proposal, we then ask the question, What TDS concentration would represent the threshold of toxicity if chloride was 450 mg/L and sulfate was at the maximum allowable? (the sulfate standard was developed to react to the toxic effects exerted by chloride - as chloride goes up, the sulfate standard goes down). We know that the sulfate and chloride in the river are overwhelmingly coupled with sodium, as is the case almost everywhere (calcium and magnesium have variously higher values elsewhere, but this would be reflected in the hardness value and thus would factor into the equation). If we add up the major anions, we get 450 + 1138 = 1588 mg/L TDS. So, we demonstrate that the 1686 mg/L TDS requested as relief by ExxonMobil is well within the TDS toxicity threshold, which I would estimate at a little over

3,000 mg/L if the cations were added in. The 1686 mg/L TDS in this case consists of more chloride than sulfate, plus adding in the sodium, Mg, Ca, and all the minor things. My example showing maximum sulfate illustrates what would be allowable under the new sulfate/existing chloride WQS. If something like 3,000 mg/L is allowable, then surely 1686 is allowable.

This was the intent of the "recalculation" of the water quality standard attempted by ExxonMobil. Of course, the driver behind 1686 mg/L is what ExxonMobil needs to have in order to comply with the consent decree. 1686 mg/L isn't the result of any calculation but rather is demonstrated to fall within the allowable range of TDS. This is better said to be a "newly" calculated standard, since there was really no initial calculation. IL is under the legacy of several of these odd ball, never calculated standards that are proving to be very hard to dig out from under.

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